

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

- 1        1. (Currently amended) An apparatus, comprising  
2              a chuck;  
3              a plurality of precision ferrules, each having at least one hole therethrough;  
4              a plurality of optical fibers;  
5              wherein said chuck holds said precision ferrules in an array with hexagonal  
6              packing and an end of each of said fibers is bonded within a respective one of said holes;  
7              and  
8              at least one additional ferrule having at least one hole therethrough that does not  
9              have bonded therein a fiber end; and  
10             wherein said hole of said at least one additional ferrule that does not have an  
11             optical fiber bonded therein is adapted to align said apparatus to a further device to which  
12             said apparatus is coupled.
  
- 1  
1        2. (Original) The invention as defined in claim 1 wherein said apparatus is  
2              optically coupled to a corresponding other hexagonally packed array.
  
- 1  
1        3. (Original) The invention as defined in claim 2 wherein said other hexagonally  
2              packed array is one of the group consisting of a micro electromechanical system (MEMS)  
3              having a hexagonal array of micro mirrors, a hexagonally packed array of photo detectors,  
4              a hexagonally packed array of light sources.
  
- 1  
1        4. (Original) The invention as defined in claim 1 wherein said chuck is fabricated  
2              to include at least one flexible member.
  
- 1  
1        5. (Original) The invention as defined in claim 1 wherein said holes of said  
2              ferrules have an average deviation from the correct positions of less than 3  $\mu\text{m}$ .

1           6. (Original) The invention as defined in claim 1 wherein said holes of said  
2 ferrules have a collective displacement of less than 3  $\mu\text{m}$ .

1           7. (Original) The invention as defined in claim 1 wherein said holes of said  
2 ferrules have an average angular misorientation of 3.9 or less degrees.

1           8. (Original) The invention as defined in claim 1 wherein said fibers are bonded  
2 within said holes using glue.

1           9. (Original) The invention as defined in claim 1 wherein said ferrules are  
2 arranged to be perpendicular to a face of said chuck.

1           10. (Original) The invention as defined in claim 1 wherein said ferrules are  
2 arranged at an angle to a face of said chuck.

1           11. (Original) The invention as defined in claim 1 wherein said chuck has a  
2 hexagonal opening within which said precision ferrules are held in said array with  
3 hexagonal packing.

1           12. (Original) The invention as defined in claim 1 wherein at least one of said  
2 ferrules has an end with a conical tip.

1           13. (Original) The invention as defined in claim 1 wherein at least one hole of  
2 said ferrules has at least one conical entrance.

1           14. (Original) The invention as defined in claim 1 wherein each of a subset of at  
2 least two of said fibers has a terminating end that is substantially flush with one end of  
3 the one of said ferrules into which said fiber is inserted, and said terminating end of all of  
4 fibers said subset being substantially coplanar.

1           15. (Original) The invention as defined in claim 14 wherein at least one of said  
2 fibers has a terminating end that is not substantially coplanar with said terminating ends  
3 of said subset of said fibers.

1           16. (Original) The invention as defined in claim 1 wherein said precision ferrules  
2 are at least two millimeters long.

1           17. (Original) The invention as defined in claim 1 wherein said precision ferrules  
2 are ceramic.

1           18. (Canceled)

1           19. (Previously presented) The invention as defined in claim 1 further comprising  
2 a layer of a non-rigid material interposed between said chuck and said ferrules that abut  
3 said chuck, said material being non-rigid with respect to said chuck and said ferrules.

1           20. (Original) The invention as defined in claim 19 wherein said non-rigid  
2 material is at least one of the group consisting of plastic, polyester, polyimide.

1           21. (Canceled)

1           22. (Previously presented) The invention as defined in claim 1, wherein said at  
2 least one additional ferrule contains an alignment member protruding therefrom.

1           23. (Original) The invention as defined in claim 1 further comprising a  
2 reinforcing sleeve coupled to said chuck.

1           24. (Original) The invention as defined in claim 1 further comprising a  
2 reinforcing sleeve integrated with said chuck.

1           25. (Original) The invention as defined in claim 1 further comprising glue in the  
2 interstices between said ferrules which acts to couple said ferrules to each other.

1           26. (Original) The invention as defined in claim 1 wherein a face of said  
2 apparatus at which said ends of said fibers protrudes is polished.

1           27. (Original) The invention as defined in claim 1 wherein said fibers are cleaved  
2 fibers.

1           28. (Original) The invention as defined in claim 1 wherein said chuck has  
2 mounting holes within it which are adapted for mounting said apparatus to a further  
3 device to which said apparatus is coupled.

1           29. (Currently amended) A method for making a precision fiber array, the method  
2 comprising the steps of:

3           securing a plurality of precision ferrules arranged with hexagonal packing in a  
4 chuck, each of said ferrules having at least one hole therethrough;

5           inserting a respective optical fiber end into the hole of each of a plurality, but less  
6 than all, of said ferrules; and

7           bonding each of said optical fiber ends to its respective one of said plurality of  
8 ferrules;

9           wherein said hole of at least one of said ferrules that does not have an optical fiber  
10          bonded therein is adapted to align said precision fiber array to a further device to which  
11          said precision fiber array is coupled.

1       30. (Previously presented) A method for making a precision fiber array, the  
2 method comprising the steps of:

3           securing a plurality of precision ferrules arranged with hexagonal packing in a  
4 chuck, each of said ferrules having at least one hole therethrough;

5           inserting a respective optical fiber end into the hole of each of a plurality of said  
6 ferrules; and

7           bonding each of said optical fiber ends to its respective one of said plurality of  
8 ferrules;

9           wherein said chuck has an interior space in which said ferrules are secured, said  
10 securing step further comprising the steps of:

11           heating said chuck to expand its interior space; and

12           inserting said plurality of precision ferrules within said interior space while it is at  
13 least somewhat expanded as a result of said heating step.

1       31. (Original) The invention as defined in claim 30 further comprising the step of  
2 bonding each of said precision ferrules to each other.

1       32. (Original) The invention as defined in claim 30 further comprising the steps  
2 of:

3           bonding each of said precision ferrules to each other; and

4           removing said chuck.

1       33. (Original) The invention as defined in claim 30 further comprising the step of  
2 polishing said optical fiber ends.

1       34. (Original) The invention as defined in claim 30 further comprising the step of  
2 aligning said optical fiber ends with an optical flat prior to performing said bonding step.

1       35. (Original) The invention as defined in claim 30 further comprising the step of  
2 coupling a reinforcing ring to said chuck.

1           36. (Original) The invention as defined in claim 30 further comprising the steps  
2       of:

3           securing in said chuck at least one additional precision ferrule having at least one  
4       hole therethrough; and

5           bonding an alignment member into said at least one hole of said at least one  
6       additional ferrule so that a portion of said alignment member protrudes from said at least  
7       one hole of said at least one additional ferrule.

1           37. (Original) The invention as defined in claim 30 further comprising the step of  
2       securing in said chuck at least one additional precision ferrule having at least one hole  
3       therethrough into which one of said fiber ends is not inserted.

1           38. (Currently amended) An apparatus, comprising:

2           a plurality of precision ferrules tightly held together to form an array with  
3       hexagonal packing, each of said ferrules having at least one hole therethrough;

4           at least two optical fiber ends being bonded within the holes of respective ones of  
5       said ferrules; and

6           wherein at least one hole of at least one of said precision ferrules does not have an  
7       optical fiber end bonded therein; and

8           wherein said hole of said at least one of said precision ferrules that does not have  
9       an optical fiber bonded therein is adapted to align said apparatus to a further device to  
10      which said apparatus is coupled.

1           39. (Original) The invention as defined in claim 38 wherein said precision  
2       ferrules are held together by glue.

1           40. (Original) The invention as defined in claim 38 wherein said precision  
2       ferrules are held together by a chuck.

1           41. (Original) The invention as defined in claim 38 wherein said apparatus is  
2       arranged so that said optical fiber ends are pointing in substantially exactly the same  
3       direction.

42. (Canceled)

1       43. (Previously presented) The invention as defined in claim 38 wherein said hole  
2       of said at least one ferrule that does not have an optical fiber end bonded therein has an  
3       alignment member bonded therein and protruding therefrom so as to be adapted to align  
4       said apparatus to a further device to which said apparatus is coupled.

1       44. (Original) The invention as defined in claim 38 further comprising at least  
2       one additional ferrule having at least one hole therethrough, wherein said hole of said at  
3       least one additional ferrule is adapted to receive an alignment member whereby said  
4       apparatus is aligned to a further device to which said apparatus is coupled.

1       45. (Previously presented) An apparatus, comprising  
2       a chuck;  
3       a plurality of precision ferrules, each having at least one hole therethrough;  
4       a plurality of optical fibers; and  
5       a layer of a non-rigid material interposed between said chuck and said ferrules that  
6       abut said chuck, said material being non-rigid with respect to said chuck and said ferrules;  
7       wherein said chuck holds said precision ferrules in an array with hexagonal  
8       packing and an end of each of said fibers is bonded within a respective one of said holes.

1       46. (Previously presented) The invention as defined in claim 45 wherein said  
2       non-rigid material is at least one of the group consisting of plastic, polyester, polyimide.  
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